PATENT SPECIFICATION

690,278

Date of Application and filing Complete Specification June 29, 1949.

No. 17233/49.

Complete Specification Published April 15, 1953.

Index at acceptance :—Classes 97(i), J7(i : x), J17c2; and 98(i), B5.

COMPLETE SPECIFICATION

Improvements in Optical View Finders

We, ETABLISSEMENTS EMEL, a French company, of 6, Rue des Suisses, Paris (Seine), France do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement: —

This invention relates to an optical viewfinder of variable field, whereby it is possible to obtain a variation of the field observed corresponding to the variations of field of objectives of the range of focal lengths normally utilised for photography (from 6 to 75 millimetres for the amateur cinematographer and from 12 to 150 millimetres for the professional) and in particular enabling scenes that are being photographed with either a still camera or a cinematographic camera to be framed.

The exigencies of cinematography impose upon the operator and upon the stage manager a make-up of their subject in terms of the frame dimensions and it is often impossible to realise the effect that a scene set in this frame will produce.

The use in the camera of objective lenses of focal lengths varying over an extensive range, as defined above, further complicates the problem.

The present invention solves this problem in a simple manner, though with known devices a more complicated technique is required.

View-finders of variable field are already known which comprise a first objective giving an inverted image of an object, and a viewing system consisting of an objective which gives another real image of this first image, and of an eye-piece with which the new image is observed.

These viewfinders however do not comprise devices for adjusting the field provided in such a manner that it is possible to obtain, independently of the field variations, a resultant image frame of constant dimensions.

A particular object of the present invention is to remove these disadvantages. For this purpose it relates to an optical viewfinder comprising a first objective producing an inverted image of an object and a viewing system consisting of an objective which gives another real image of this first image, and an eye-piece with which this second image is obesrved, this viewfinder being characterised by means for separately and simultaneously modifying the relative positions of the objective of the viewing system and of the eye-piece thereof in relation to the first objective, in such a manner that the resultant image, given by the objective of the viewing system, of the image produced by the first objective is subjected to a diaphragm at a fixed distance from the eye-piece and located in the plane of the image given by the objective of the viewing system, so as to provide an image limited to a frame of constant dimensions while enabling the magnification of the said viewfinder to be modified.

According to one embodiment, a diaphragm of constant aperture is placed between the objective of the viewing system and the eye-piece and follows the displacements of the said eye-piece in such a manner as to be situated in the plane of the image given by the objective of the viewing system, said diaphragm enabling the resultant image given by the viewfinder to be limited to an image frame of constant dimensions.

A converging lens or a converging optical system is interposed between the first objective and the objective of the viewing system in the plane of the image produced by the first system. According to another embodiment, the first objective of the viewfinder is mounted on a viewfinder body in which slide two tubes, one carrying the objective of the viewing system and the other carrying the eye-piece. These two tubes are set, at certain distances from the first objective which are

varied according to the focal length of the camera objective the field of which it is desired to determine, by means of pins on the tubes engaging a rectilinear longitudinal slot in the viewfinder body and grooves one for each tube, of definite profile hollowed out in an adjusting sleeve rotatable on the body in such a way that when this sleeve is turned the pin corresponding to each of the tubes is on the one hand constrained, by the action of the rectilinear longitudinal slot, to remain on the same generatrix of the viewfinder body, and on the other hand constrained to follow the grooves of definite profile hollowed out in the adjusting sleeve, so that when the rotatable adjusting sleeve turns said pins are displaced longitudinally and the said two tubes are moved.

Optical view-finders of variable field according to the invention are illustrated by way of example in the accompanying drawings, in which:—

Figure 1 is a diagrammatic view of the viewfinder of variable field;

Figure 2 is a view finder of variable field comprising a field lens;

Figure 3 illustrates, in section one embodiment of the viewfinder illustrated in Figure 2.

The optical viewfinder of Figure 1 comprises a first objective lens 1 and a viewing system comprising an objective lens 2 and an eye-piece 3.

The objective 2 and the eye-piece 3 are displaceable along the optical axis relatively to the objective 1.

The objective 1 gives an inverted image of the object, and the objective 2 gives an image of that image, situated in its image plane which is observed by means of the eye-piece 3. The objective 2 is movable and the eye-piece is displaced in such a way as to be fixed in relation to the plane of the image produced by the objective 2, in which plane a diaphragm of fixed magnitude 4 is arranged. When the distance d between the plane of the real image given by the objective 1 and the object focal plane of the objective 2 varies the magnification of the objective varies; its value being in fact: $g=\frac{f}{d}$, where f denotes the focal length of the objective 2, and g its magnification; d designating the distance between the plane of the real image given by the objective 1 and the object focal plane of the objective 2. It follows from this that the diaphragm 4 of constant magnitude is equivalent to a diaphragm 5^1 of variable magnitude, indicated in dotted lines in Figure 1 in the plane of the image produced by the objective 1, and in order to obtain a diaphragm image 5^1 of a definite aperture corresponding to the field of the camera objective to be used, all that is necessary is to give to the view finder objective 2 a position corresponding to the necessary magnification.

In the optical viewfinder represented in Figure 2 a convergent lens 8 is placed in the plane of the image given by the objective 1, to enable the objective lens of the viewing system to cover the entire field produced by the first objective lens. The power of lens 8 is such that the optical centre of the first objective lens has for its conjugate focus in the lens 8 the viewing objective lens for the smallest magnification.

One form of construction of the optical viewfinder, comprising a device enabling the desired displacements, to be imparted to the objective 2 and to the eye-piece 3 and diaphragm 4 simultanously, is shown by way of example in Figure 3.

The objective 1 and the convergent lens 8 are mounted upon a tube forming the body 9 of the optical viewfinder in which slide two tubes 10 and 11, one carrying the objective 2 and the other carrying the eye-piece 3 and the diaphragm 4.

The tubes 10 and 11 carry pins 10^1 and 11^1 respectively, the former sliding in a rectilinear longitudinal slot 12 provided in the body 9 and in a helical groove 13 provided in a sleeve 15 revolving upon the body 9, and the second sliding in the same slot 12 and in a groove 14 hollowed out in the sleeve 15, and having a profile determined as a function of that of the groove 13, for the purpose of causing the focal plane constituting the object of the eye-piece 3 to coincide with the plane of the image given by the objective 2. The sleeve 15 cannot slide relatively to the body 9, the point of a screw 16 screwed into this sleeve 15 engaging in a circular groove 17 provided on the periphery of the body 9.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An optical viewfinder comprising a first objective producing an inverted image of an object and a viewing system consisting of an objective, giving another real image of this first image, and an eye-piece with which this second image is observed, characterised by means for separately and simultaneously modifying the relative positions of the objective of the viewing system and of the eye-piece thereof in relation to the first objective, in such a manner that the resultant image, given by the objective of the viewing system, of the image produced by the

first objective is subject to a diaphragm at a fixed distance from the eye-piece and located in the plane of the image given by the objective of the viewing system, so as to provide an image limited to a frame of constant dimensions while enabling the magnification of the said viewfinder to be modified.

2. An optical viewfinder as claimed in Claim 1, characterized by the provision of a converging lens or an optical converging system interposed between the first objective and the objective of the viewing system in the plane of the image formed by the first objective.

3. An optical viewfinder as claimed in Claim 1 or 2, characterized in that the first objective of the view-finder is mounted on a viewfinder body in which slide two tubes, one carrying the objective of the viewing system and the other carrying the eye-piece and a diaphragm, said two tubes being set, at certain distances from the first objective which are varied according to the focal length of the camera objective the field of which it is desired to determine, by means of pins on the tubes engaging a rectilinear longitudinal slot in the viewfinder body and grooves, one for each tube, of a definite profile hollowed out in an adjusting sleeve rotatable on the body in such a way that when this sleeve is turned the pin corresponding to each of the tubes on the one hand is constrained by the action of the rectilinear longitudinal slot, to remain on the same generatrix of the viewfinder body, and on the other hand is constrained to follow the grooves of definite profile hollowed out in the adjusting sleeve, so that when the rotatable adjusting sleeve turns said pins are displaced longitudinally and the two tubes are moved therewith.

4. An optical viewfinder substantially as described and illustrated in the accompanying drawings.

Dated this 28th day of June, 1949.

MARKS & CLERK.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1953.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

690,278 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

Fig:2

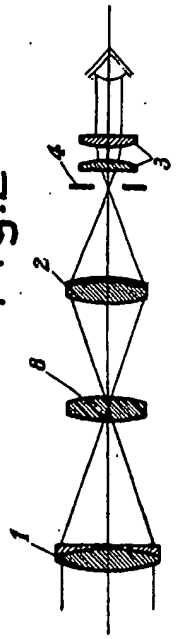

Fig:1

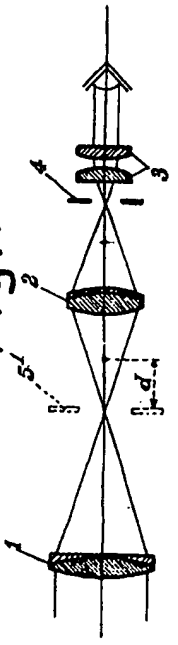

Fig:3